REMARKS

Rejections Under 35 USC §102(e)

Claims 1, 5-7, 9-12, 17, 18, 25-27 and 31 have been rejected under 35 USC §102(e) as being anticipated by Soejima et al. (US Patent No. 6,114,864).

Claims 2, 8 and 32 have been objected to but would be allowable if rewritten in independent form.

AMENDMENTS TO CLAIMS

In response to the rejections, claims 1, 5-7, 9-12, 17, 18, 25-27 and 31 have been amended.

Objected to claim 2 has been rewritten in independent form with the limitations of independent claim 1. Claim 5 has been amended to depend on claim 2, and to include the limitation of a conductive via in electrical communication with the connecting segment (40B-Figure 3A). The conductive via 42B is shown in Figure 3A, and is described on page 13, lines 15-18 of the specification.

Objected to claim 8 has been rewritten in independent form with the limitations of independent claim 6. Claim 9 has been amended to depend on claim 8, and to include the limitation of the conductive via (42B-Figure 3A). Claim 10 has been amended to depend on claim 9, and to include the limitation of a contact (38B-Figure 3C) in electrical communication with the conductive via. Claim 11 has been amended to depend on claim 8.

Independent claim 31 has been amended to include the limitations of objected to claim 32. Claim 32 has been amended to include the limitation of the conductive via (42B-Figure 3A).

Independent claim 12 has been amended to include the limitation of "a segment on the substrate electrically connecting the leads", which is the connecting segment 40B of Figure 3A. Independent claim 12 and dependent claims

17-18 should thus be allowable for the same reasons as objected to claims 2, 8 and 32.

Independent claim 25 has also been amended to include the limitation of "a segment on the substrate electrically connecting the leads". Independent claim 25 and dependent claims 26-27 should thus be allowable for the same reasons as objected to claims 2, 8 and 32.

With these amendments claims 2, 5, 8-12, 17, 18, 25-27 and 31-32 should be in a condition for allowance without further argument.

Independent claims 1 and 6 have also been amended to include additional limitations which patentably distinguish these claims from Soejima et al and the prior art in general. In particular, independent claims 1 and 6 recite "metal leads", and state "each metal lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant". In Soejima et al. the leads (conductive film 15) are metal but are formed on an insulation resin film 14 (column 11, lines 36-37). In addition, the insulation resin film 14 is configured to deform into the cavities 12 (column 12, lines 32-34). Thus although the leads (conductive film 15) inherently possesses a spring constant the flexibility of the insulation resin film 14 controls the deflection of the leads (conductive film 15). In addition, the length, width, thickness and modulus of the leads (conductive film 15) are not selected to provide a desired spring constant.

The selected spring constant of the present leads provides an improved interconnect because the leads can be configured to provide better support and to make better electrical contact with the bumped terminal contacts. This is not the case with the leads (conductive film 15) off Soejima et al. because the insulation resin film 14 controls the position of the leads, and its flexibility

cannot be as precisely adjusted as with the present metal leads.

Independent claim 6 also includes the limitation of each lead having "a shape that substantially matches a topography of the bumped contact". This feature would not be inherently included in the leads (conductive film 15) of Soejima et al. because it is supported by the insulation resin film 15 which can not conform to the topography of bumped contacts. In addition although Soejima et al. teaches concave recesses (12A-Figure 5) in the substrate 11, there is no teaching of shaped leads as presently claimed. As with the selected spring constant, the shaped leads provide an improved interconnect because the leads can be configured to provide better support and to make better electrical contact with the bumped terminal contacts.

CONCLUSION

In view of the above arguments, favorable consideration and allowance of claims 1, 5-7, 9-12, 17, 18, 25-27 and 31 is requested.

In addition, an Information Disclosure Statement is being filed concurrently with this Amendment. The IDS cites allowed application no. 09/275,791, which has a filing date of March 25, 1999, and references cited during prosecution thereof. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

DATED this 29th day of July, 2002.

Respectfully submitted:

Stephen A. Gratton
Registration No. 28,418
Attorney for Applicants

2764 South Braun Way
Lakewood, CO 80228
Telephone: (303) 989 6353
Fax: (303) 989 6538

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to: Assistant Commissioner of Patents, BOX AMENDMENT, Washington, D.C. 20231 on this 29th day of July, 2002.

July 29, 2002
Date of Signature

Stephen A. Gratton
Attorney for Applicants

Marked Version Of Amended Claims Showing Changes

1. (twice amended) An interconnect for testing a semiconductor component having a bumped contact comprising:

a substrate; and

a contact on the substrate configured to electrically engage the bumped contact, the contact comprising a recess in the substrate having a size approximately equal to that of the bumped contact, and a plurality of flexible metal leads cantilevered over the recess configured to support the bumped contact within the recess and to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, each metal lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant.

[a selected spring constant and at least one projection configured to penetrate the bumped contact.]

2. (twice amended) [The interconnect of claim 1 further comprising]

An interconnect for testing a semiconductor component having a bumped contact comprising:

a substrate; and

a contact on the substrate configured to electrically engage the bumped contact, the contact comprising a recess in the substrate having a size approximately equal to that of the bumped contact, a plurality of flexible leads cantilevered over the recess configured to support the bumped contact within the recess and to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, each lead having a selected spring constant and at least one projection configured to penetrate the bumped contact,

and a connecting segment substantially encircling a periphery of the recess configured to electrically connect the leads to one another.

5. (twice amended) The interconnect of claim 2 further comprising a conductive via in the substrate in electrical communication with the connecting segment.
[1 wherein the recess has four sides and the plurality of leads comprise four leads on the four sides.]

6. (twice amended) An interconnect for testing a semiconductor component having a bumped contact comprising:

a substrate;

a recess in the substrate; and

a plurality of flexible metal leads on the substrate cantilevered over the recess configured to electrically engage the bumped contact and to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, each metal lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant, and a shape that substantially matches a topography of the bumped contact.

7. (twice amended) The interconnect of claim 6 wherein each lead includes [at least one] a projection configured to penetrate the bumped contact.

8. (twice amended) [The interconnect of claim 6 further comprising]

An interconnect for testing a semiconductor component having a bumped contact comprising:

a substrate;

a recess in the substrate;

a plurality of flexible leads on the substrate cantilevered over the recess configured to electrically engage the bumped contact and to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, each lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant, and a shape that substantially matches a topography of the bumped contact; and

a connecting segment on the substrate electrically connecting the leads to one another.

9. (twice amended) The interconnect of claim 8 further comprising a conductive via in the substrate in electrical communication with the connecting segment.
[6 wherein each lead comprises an enlarged portion on the substrate and a terminal portion cantilevered over the recess for contacting the bumped contact.]

10. (twice amended) The interconnect of claim 9 further comprising a contact on the substrate in electrical communication with the conductive via.
[6 wherein each lead comprises a metal selected from the group consisting of tungsten, titanium, nickel, platinum, iridium, or vanadium.]

11. (twice amended) The interconnect of claim [6] 8 wherein the recess has four sides and the plurality of leads comprise four leads on the four sides.

12. (twice amended) An interconnect for testing a semiconductor component having a bumped contact comprising:

a substrate;

a recess in the substrate; [and]

a plurality of leads on the substrate cantilevered over the recess and configured to move [support] and to electrically engage the bumped contact within the recess, [and to move in a z-direction within the recess to accommodate variations in a height or a diameter of the bumped contact,] each lead having a radius of curvature substantially equal to a radius of the bumped contact; and

a segment on the substrate electrically connecting the leads.

17. (twice amended) The interconnect of claim 12 wherein each lead has a cantilevered length, a width, [and] a thickness [configured] and a modulus of elasticity selected to provide a desired spring constant.

18. (twice amended) The interconnect of claim 12 further comprising a conductive via in the substrate in electrical communication with the segment.

[wherein each lead has an enlarged portion on the substrate and a terminal portion cantilevered over the recess for contacting the bumped contact.]

25. (twice amended) A system for testing a semiconductor component having a bumped contact comprising:

a carrier for retaining the semiconductor component;

an interconnect on the carrier comprising a substrate, a recess in the substrate having a size approximately equal to that of the bumped contact, [and] a plurality of leads cantilevered over the recess configured to electrically engage the bumped contact and to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, and a segment on the substrate electrically connecting the leads; and

[each lead comprising at least one projection configured to penetrate the bumped contact; and]

a test circuitry in electrical communication with the leads configured to apply test signals to the component.

26. (twice amended) The system of claim 25 wherein each lead [includes a non bonding outer layer and] has a radius of curvature substantially equal to a radius of the bumped contact.

27. (twice amended) The system of claim 25 <u>further comprising a conductive via in the substrate in electrical communication with the segment.</u>
[wherein the semiconductor component comprises an element selected from the group consisting of semiconductor dice, semiconductor packages and semiconductor wafers.]

31. (twice amended) A system for testing a semiconductor component having a bumped contact comprising:

a testing apparatus;

an interconnect [mounted to] <u>on</u> the testing apparatus comprising:

a substrate;

a recess in the substrate having a size approximately equal to that of the bumped contact; [and]

a plurality of leads on the substrate configured to electrically engage the bumped contact, each lead cantilevered over the recess and configured to move within the recess by a distance sufficient to accommodate variations in a size, a shape or a planarity of the bumped contact, each lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant, and a shape substantially matching a topography of the bumped contact; and

<u>a connecting segment on the substrate electrically connecting the leads; and</u>

a test circuitry in electrical communication with the connecting segment.

32. (twice amended) The system of claim 31 further comprising a conductive via in the substrate in electrical communication with the connecting segment.
[wherein a connecting segment substantially encircles a periphery of the recess and electrically connects the leads.]